Remarks/Arguments

The Examiner is thanked for the careful review of this application. Claims 1-16 and 21 are pending after entry of the present Request for Reconsideration. Claims 2 and 17-20 were cancelled.

Rejections under 35 U.S.C. § 103:

The Office has rejected claims 1, 3-16, and 21 under U.S.C. 103(a), as being unpatentable over United States Patent 6,207,544 to Nguyen et al. (hereinafter referred to as "Nguyen") in view of United States Patent 6,333,271 to Chiu et al. (hereinafter referred to as "Chiu"). In a like manner, the Office has rejected claims 1, 3-16, and 21 as being unpatentable over United States Patent 6,277,700 to Yu et al. (hereinafter referred to as "Yu") in view of Chiu. For the reasons stated below, Applicants respectfully traverse the Office's rejections.

It is submitted that the combination of Nguyen and Chiu as well as Yu and Chiu do not raise a *prima facie* case of obviousness against the subject matter defined in independent claims 1, 6, 7, and 21. First, to establish a *prima facie* case of obviousness based on a combination of references, there must exist some suggestion or motivation, either in the references or in the knowledge generally available to one having ordinary skill in the art, to combine Nguyen and Chiu or Yu and Chiu in the manner proposed by the Office. Second, the suggested combinations do not teach or suggest all the features defined in independent claims 1, 6, 7, and 21.

Considering the first combination, it is submitted that the requisite suggestion or motivation to combine Nguyen and Chiu in the manner proposed by the Office is lacking. Nguyen focuses on a method for fabricating very thin silicon nitride spacers on a transistor using one anisotropic etching process. As acknowledged by the Office, Nguyen uses optical spectrometry to determine the endpoint of the etch process.

As acknowledged by the Office, Chiu teaches using a first plasma etch method using a first detection apparatus (such as interferometry) to partially etch a microelectronic layer and employing a second plasma etch employing a second detection apparatus (Plasma emission spectroscopy) to determine the endpoint of plasma etching and measure/control the thickness. In column 9, lines 1-3, Chiu teaches that the second detection method typically and preferably uses a plasma emission spectrometer.

It is respectfully submitted that by combining the one-step etch process of Nguyen with the two-step etch processes of Chiu one of ordinary skill in the art would not have arrived at the claimed invention, as defined in claims 1, 6, 7, and 21. Specifically, one of ordinary skill in the art would not have arrived at monitoring the second etch process using a non-IEP etch endpoint detection process. As explained in the subject application, several different types of non-IEP etch endpoint detection methods exist (e.g., timed mode, capacitance tune setting change, etc.) each of which can be used to determine the endpoint of the second etch process in the claimed invention.

Nor would one of ordinary skill in the art have been motivated to discontinue the second etch process in response to monitoring the etch process by OES method and discontinuing the second etch process after a predetermined period of time. Instead, the second etch process of Chiu is stopped once the substrate surface is reached, and not in response to the monitoring and when the second etch process has been continued for a predetermined period of time.

In fact, Nguyen teaches that using He makes OES endpoint detection easier. As such, Applicants submit one reading Nguyen would not be motivated to use a different type of etch endpoint detection (non-IEP, optical, time mode), because a simple solution is offered by Nguyen (i.e., adding He). One of ordinary skill in the art would not disregard the solution set forth in Nguyen (i.e., increase the level of He) to search for a remedy in a different reference and a different etch endpoint detection method.

Yet further, even if Nguyen was modified using the two step etch process of Chiu, the combination of Nguyen and Chiu fails to teach or suggest that the thickness of the thin spacer layer is substantially uniform throughout the surface of the substrate and the gate structure (as defined in claims 6, 7, and 21). Chiu discloses a range of thickness for the partially etched microelectric layer. However, Chiu does not teach that the thickness of the partially etched micorelectric layer is uniform throughout the surface of the substrate, as defined in claims 6, 7, and 21 of the claimed invention.

Additionally, the combination of Nguyen and Chiu does not suggest performing the two step etch operation *in situ*, as defined in claim 7. First, Chiu specifically teaches using two different types of endpoint detection apparatuses. As such, the etch chamber in Nguyen has to be modified so as to incorporate and accommodate not only two separate etch processes

but also two different endpoint detection equipment and machinery. It must be noted that while Nguyen refers to performing the etching process in situ, Nguyen merely refers to using a single etch endpoint detection apparatus, and not more. However, such modifications have not been addressed or suggested in Nguyen or Chiu. One of ordinary skill in the art appreciates that including all the components of interferometry endpoint detection apparatus as well as plasma spectroscopy detection apparatus in one chamber requires that the chamber have sufficient space for the two different apparatuses. Furthermore, including the two separate apparatuses must be achieved such that the two apparatuses do not interfere with each other during operation. Again, none of such issues has been addressed or taught in either one of the references.

Furthermore, Nguyen specifically teaches that spacers can be formed using one etch process, as provided in the following excerpt from column 6, lines 57-64 of Nguyen:

> As will be recognized by those skilled in the art upon a complete reading of the present application, a very thin nitride spacer can be formed in accordance with the present invention by using only one of the aforementioned steps, i.e., it is not necessary to use two separate etching steps. That is, the sidewall spacers 42 of the present invention may be formed using, only the initial etching process described above. (Emphasis added.)

Thus, one of ordinary skill in the art, taking Nguyen as a whole, would not be motivated to use two etch processes to form the spacers in Nguyen specifically when Nguyen teaches that the spacers can be made in one etch process. Still further, by Nguyen particularly emphasizing that spacers can be formed using only one etch process implementing the OES detection method, one reading Nguyen would not have been motivated to use two step etch processes, each using a different endpoint detection method, as defined in claims 1, 6, 7, and 21.

Additionally, by detecting the etch endpoint using optical spectrometry, the first etch process of Nguyen cannot be stopped when merely a specific portion of the spacer layer has been removed. Optical spectroscopy endpoint detection detects the conclusion of etch process by using the light emission intensity of the plasma and its direct proportionality to the concentration of the silicon nitride in the etch chamber. In the same manner, one cannot determine whether the remaining thin spacer layer has a specific thickness or a uniform thickness throughout the surface of the substrate.

With regards to Yu, Applicants submit that Yu teaches a method of etching silicon nitride spacers beside a gate structure using a main etch step and an over etch step. The main etch step uses an end point detection while the over etch step is taught to be a percentage of the main etch. Applicants respectfully submit that the combination of Yu and Chiu is improper because one having ordinary skill in the art would not have combined Yu and Chiu in the manner proposed by the Office. As previously discussed with respect to the combination of Nguyen and Chiu in more detail, the first etch process in Yu is taught to stop on removal of up to 95% of endpoint of the layer. This, however, does not suggest removing a portion of the spacer layer that has a specific thickness, as defined in the claimed invention.

Moreover, one of ordinary skill in the art would not have arrived at the claimed invention, as defined in claims 1, 6, 7, and 21 by combining the fabrication of silicon nitride spacers taught by Yu with the IEP etch endpoint detection method taught in Chiu because the second etch process of Yu is performed for a percentage of the first etch process. As such, even if the plasma spectroscopy of Chiu were to be used in Yu, the second etch process would not have been performed for a predetermined period of time. Nor would the second etch process be monitored by OES detection method. Rather, in Yu, the over etch step is performed for a percentage of time of the main etch step time. As a result, the time for the second etch process varies and is dependent on the time for the first etch step which can change depending on the initial thickness of the silicon nitride layer.

Still further, even if Yu were modified using the two step etch process of Chiu, the combination of Yu and Chiu fails to teach or suggest that the thickness of the thin spacer layer is substantially uniform throughout the surface of the substrate and the gate structure (as defined in claims 6, 7, and 21). Yu does not address or disclose that the thickness of the over etch layer is uniform throughout the surface of the substrate, as defined in claims 6, 7, and 21 of the claimed invention.

Additionally, the combination of Nguyen and Chiu does not suggest performing the two step etch operation *in situ*, as defined in claim 7. Chiu specifically teaches using two different types of endpoint detection apparatuses. As such, similar to Nguyen, the etch chamber in Yu has to be modified so as to incorporate and accommodate two separate etch processes using two different endpoint detection equipments. However, such modifications have not been addressed or suggested in Yu or Chiu. Arguments set forth above regarding the

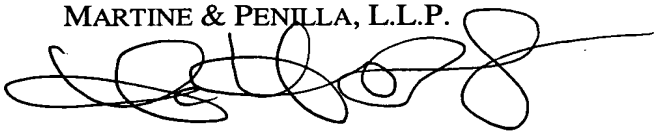
combination of Nguyen and Chiu failing to disclose the claimed invention equally applies to the combination of Yu and Chiu.

Therefore, it is respectfully submitted that independent claims 1, 6, 7, and 21 are patentable under 35 U.S.C. § 103(a) over any combination of the cited prior art. In a like manner, dependent claims 3-5 and 8-16 which incorporate each and every element of the applicable independent claim are patentable under 35 U.S.C. § 103(a) over any combination of the cited prior art for at least the same reasons discussed above.

Applicants hereby submit that this Request for Reconsideration complies with 37 C.F.R. 1.116(b) and should be entered.

In view of the foregoing, Applicants respectfully submit that all of the pending claims 1-16 and 21 are in condition for allowance. Accordingly, a Notice of Allowance is respectfully requested. If the Examiner has any questions concerning the present Preliminary Amendment, the Examiner is kindly requested to contact the undersigned at (408) 749-6900, ext. 6913. If any additional fees are due in connection with filing this Amendment, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. LAM2P295). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
MARTINE & PENILLA, L.L.P.



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